

REMARKS

Summary of the Amendment

Upon entry of the above amendment, Claims 30, 34, 37 and 40 will have been amended. Accordingly, Claims 30-37, 40-44 and 47-49 remain currently pending. For the reason set forth below, Applicant submits that each of the pending claims is allowable over the cited art, and an indication of allowability of the present application is therefore respectfully requested.

Summary of the Office Action

In the subject Office Action, the disclosure and Claims 30 and 40 are objected due to formal matters; Claims 35, 42 and 47-49 are rejected as purportedly being indefinite; Claims 30 and 31 are rejected as being anticipated over the art of record; and Claims 30-37, 40-44 and 47-48 are rejected under the judicially created doctrine of obviousness-type double patenting. By the present Amendment and Remarks, Applicant submits that the rejections have been overcome, and respectfully requests reconsideration of the outstanding Office Action.

Acknowledgement of Allowable Subject Matter

Applicant gratefully acknowledges the Examiner's indication that Claim 49 would be allowable if rewritten to overcome the rejection(s) of the parent claim under 35 U.S.C. § 112, second paragraph set forth in the subject Office Action and to include all limitations of the base claim and any intervening claims.

Objection to Disclosure

The disclosure is objected to because of the following informalities: (1) there is no reference numeral "160a" (page 6, line 7) in the Figures; and in page 6, line 17, the phrase ". . . in that the are . . ." is unclear.

Applicant has amended the specification to overcome the aforementioned objection. In particular, the reference numeral "160a" in lines 6 and 10, page 6, has been

replaced with reference numerals -- 116a, 118a, and 120a -- which properly reference the outer edges of leads 116, 118, and 120 as shown in Figure 3. Moreover, the word “the” has been replaced with the word -- they -- .

Accordingly, in view of the foregoing, Applicant requests that the Examiner withdraw the objection to the specification.

Objection to the Claims

Claims 30 and 40 are objected to as follows: (1) in Claim 30, line 10, the Examiner submits that the phrase “encapsulant material” is unclear as to whether it is being referred to as “an encapsulant material”; and in Claim 40, line 13, the Examiner has brought to the Applicant’s attention to the phrase “flush wish” which should be -- flush with --.

By the Amendment, Claim 30 has been amended to insert the word “an” before the first occurrence of “encapsulating material.” This amended format is consistent to that of Claim 40, and is believed to overcome the Examiner’s objection.

Claim 40 has itself been amended to change “flush wish” to – flush with -- as suggested by the Examiner.

Accordingly, in view of the above aforementioned comments and amendments to Claims 30 and 40, Applicant requests that the Examiner withdraw the objections to Claims 30 and 40.

Traversal of Rejection Under 35 U.S.C. § 112, Second Paragraph

Applicant respectfully traverses the rejection of Claims 35, 42 and 47-49 as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicant regards as the invention.

The Examiner submits that in Claim 35, line 2, the phrase “each of the leads includes a recessed portion” is unclear as to how a lead includes a recessed portion. With regard to Claim 42, line 2, the Examiner contends that the phrase “each of the leads has a recessed portion” is unclear as to how a lead has a recessed portion. With regard to Claim 47, line 14, the Examiner submits the phrase “each of the leads having a recessed portion” is unclear as to how a lead has a recessed portion. The Examiner also submits

that the recess portion of the die pad 104 is formed adjacent to the leads 106, 114, 116, 118, 120, and recommends that the aforementioned phrases be amended to “a recessed portion formed adjacent to each of the leads”.

Recessed Portions are Formed in Leads 106 and 114

Applicant submits that the Examiner’s position with regard to the “recessed portions” in the leads is inappropriate and that Claims 35, 42 and 47-49 do particularly point out and distinctly claim the subject matter which the Applicant regards as the invention.

First, Applicant would like to direct to the attention of the Examiner to the disclosure of the application on page 5, lines 6-26 which describes the recessed portions 127 formed in the leads 106 and the recessed portions formed in the lead 114. It is also readily apparent from the specification that the recessed portions are formed in the leads 106, 114 *before* the body of the package 100 is formed by encapsulant 194. Thus, the Applicant does not believe that the Examiner’s recommendation that the aforementioned phrases be amended to “a recessed portion formed adjacent to each of the leads” is appropriate, and respectfully submits that the Section 112 rejection of Claims 35, 42 and 47-49 should be withdrawn.

Accordingly, Applicant requests that the Examiner reconsider and withdraw the rejection of Claims 35, 42 and 47-49 under 35 U.S.C. § 112, second paragraph, and indicate that these claims are fully in compliance with the requirements of the statute.

In re “thereof”

Also, in regard to Claim 35, line 3; Claim 42, line 42; and Claim 47, line 15, the Examiner submits that the word “thereof” is unclear as to whether it is being referred to the die pad or the lead. Applicant traverses this assertion. In this regard, Applicant respectfully submits that the plain grammatical context in which the term “thereof” is used in each of Claims 35, 42 and 47 clearly demonstrates that such term is referring to the second surface of the lead.

Accordingly, Applicant requests that the Examiner reconsider and withdraw the rejection of Claims 35, 42 and 47-49 under 35 U.S.C. § 112, second paragraph, and indicate that these claims are fully in compliance with the requirements of the statute.

Terminal Disclaimer

Claims 30-37, 40-44, 47 and 48 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over Claims 1-8, 12, 14-17, 21 and 22 of U.S. Patent 6,630,726 to Crowley et al.

Submitted herewith for the Examiner's consideration is a duly executed Terminal Disclaimer in compliance with 37 C.F.R. 1.321(c) in which Applicant has agreed to disclaim that term of any patent issuing in relation to the present application which extends beyond the expiration date of U.S. Patent 6,630,726 to Crowley et al.

Accordingly, Applicant respectfully submits that the submission of the Terminal Disclaimer effectively overcomes the obviousness-type double patenting rejection advanced in relation to Claims 30-37, 40-44, 47 and 48.

Traversal of Rejection Under 35 U.S.C. § 102(e)

In re LAM

Applicant traverses the rejection of Claim 30 under 35 U.S.C. § 102(e) as being clearly anticipated by U.S. Patent No. 6,256,200 to Lam et al. [hereinafter "LAM"].

Figures 6A-6F illustrate a process used to package a three-terminal die, such as a power MOSFET. As shown in Figure 6A, lead frame 100 includes a relatively large central portion 102 which will be attached to the source terminal 112 and a relatively thin lead 104 that will be attached to the gate terminal 114. Portion 102 and lead 104 are connected together by tie bars 107 and 109. Six cutouts 106 are formed in portion 102, creating a total of eight source leads. Figure 6B shows the underside of lead frame 100. Notches 116 and 118 are formed in portion 102 in locations where portion 102 will overlie the edges of die 110. Similarly, notches 120 and 122 are formed in lead 104. Figure 6C shows lead frame 100 attached to die 110 by a layer of epoxy 124, with notches 116, 118, 120 and 122 overhanging the edges of die 110. Figure 6D shows the

combination of lead frame 100 and die 110 with a heat sink 126 attached to the backside of die 110. The structure is then encased in a capsule of injection-molded plastic and, as shown in Figure 6E, tie bars 107 and 109 are trimmed, yielding six leads 130A-130F connected to the source terminal of die 110 and two leads 132A and 132B connected to the gate terminal of die 110. Figure 6F shows the structure after the leads 130A-130F and 132A and 132B have been bent such that the bottoms of the outer portions of the leads are bent flat and are coplanar, and thus can make contact with a flat surface, such as a printed circuit board. Figure 6F also shows the plastic capsule 134 which encases the die 110. Plastic capsule 134 does not cover the bottom surface of heat sink 126, which is left exposed to provide an electrical contact with the backside of die 110.

Applicant's Claim 30 as amended recites, *inter alia*, a die having a bottom and top surface; the bottom surface of the die being mounted to the first surface of the die pad; a conductive strap electrically connected to and extending between the top surface of the die and the first surface of at least one of the leads which is not integrally connected to the die pad;

In comparison, LAM does not teach at least the aforementioned features recited in Claim 30. The Examiner submits that the "thin lead" 104 taught by LAM is a die pad. A portion of one of the planar surfaces of LAM die 110 is attached to the so-called die pad 104. The large central portion 102 of the LAM leadframe 100 which the Examiner considers the strap, is also attached to the same planar surface of the LAM die 110. Therefore, LAM does not clearly teach each and every element recited in Claim 30.

For the foregoing reason, because LAM fails to disclose the above-noted features of the present invention, Applicant submits that LAM fails to disclose each and every feature of the present invention, as recited in Claim 30. Accordingly, Applicant submits that the Examiner has failed to provide an adequate evidentiary basis to support a rejection under 35 U.S.C. § 102(e) and that the rejection of Claim 30 is improper and should be withdrawn.

In re GLENN

Applicant traverses the rejection of Claims 30 and 31 under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent No. 6,566,164 to Glenn et al. [hereinafter "GLENN"].

Figures 3 and 4 of GLENN teach a semiconductor package device 110 which includes a die 14 that is electrically connected to a portion of a leadframe 16B with a metal strap 130. The die 14 and at least portions of the strap 130 and leadframe 16 are encapsulated in an insulative encapsulant 18. A top surface 130B of the strap 130 is exposed to the environment through the encapsulant 18.

Applicant's Claim 30 as amended recites, *inter alia*, ...an encapsulant material encapsulating the die, . . . and at least a portion of each of the leads such that the second surface of each of the leads is *exposed* in and *substantially flush with an exterior surface of the encapsulant material*.

In comparison, GLENN does not teach at least the aforementioned features recited in Claim 30. As shown in Figure 4, the leads 1-8 simply protrude from the respective opposed sides of the encapsulant 18, as opposed to being exposed in and substantially flush with a common exterior surface of the encapsulant 18. Hence, GLENN does not anticipate the invention recited in Claim 30 since GLENN does not teach *inter alia*, encapsulant material encapsulating the die, . . . and at least a portion of each of the leads such that the second surface of each of the leads is *exposed* in and *substantially flush with an exterior surface of the encapsulant material*.

For the foregoing reason, because GLENN fails to disclose the above-noted features of the present invention, Applicant submits that GLENN fails to disclose each and every recited feature of the present invention, as recited in Claim 30. Accordingly, Applicant submits that the Examiner has failed to provide an adequate evidentiary basis to support a rejection under 35 U.S.C. § 102(e) and that the present rejection of Claim 30 is improper and should be withdrawn.

Dependent Claims 31-37

Applicant further submits that Claims 31-37 are allowable at least for the reason that these claims depend from allowable independent Claim 30 and because these claims recite additional features that further define the present invention.

In particular, Applicant submits that LAM and GLENN fail to teach or suggest, *inter alia*, wherein a portion of the conductive strap is exposed in the encapsulant material, as recited in Claim 31; wherein at least a portion of the second surface of the die

pad is exposed in the encapsulant material, as recited in Claim 32; wherein the conductive strap includes a through hole which is filled with the encapsulant material, as recited in Claim 33; wherein the conductive strap comprises a first end portion coupled to the die, a second end portion coupled to the first surface of at least one of the leads, and a central portion extending between the first and second end portions, the central portion having a through hole formed therein which is filled with the encapsulant material, as recited in Claim 34; wherein each of the leads includes a recessed portion which is adjacent to the second surface thereof and is filled with the encapsulant material, as recited in Claim 35; wherein the die pad has a recessed portion which is adjacent to and extends about the periphery of the second surface thereof, the recessed portion of the die pad being filled with the encapsulant material, as recited in Claim 36; and wherein the conductive strap includes a flange portion having the lip formed thereon, a conductive layer is disposed between the flange portion and the die and between the lip and the die, and the conductive layer has a first thickness adjacent to the lip and a second thickness adjacent to the flange portion, the first thickness exceeding the second thickness, as recited in Claim 37.

Claims 40-44, 47 and 48 are Allowable

In light of the Terminal Disclaimer submitted herewith this response, there are no current outstanding grounds of rejection with regard to Claims 40-44, 47 and 48. On the basis of the foregoing, Applicant respectfully submits that Claims 40-44, 47 and 48 are now in condition for allowance.

CONCLUSION

In view of the foregoing, it is submitted that none of the references of record, anticipate or render obvious the Applicant's invention as recited in Claims 30-37, 40-44 and 47-49. The applied references of record have been discussed and distinguished, while significant claimed features of the present invention have been pointed out.

Further, any amendments to the claims which have been made in this response and which have not been specifically noted to overcome a rejection based upon the prior art, should be considered to have been made for a purpose unrelated to patentability, and no estoppel should be deemed to attach thereto.

Accordingly, reconsideration of the outstanding Office Action and allowance of the present application and all the claims therein is respectfully requested and now believed to be appropriate.

If any additional fee is required, please charge Deposit Account Number 19-4330.

Respectfully submitted,

Date: 6/10/04

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